

**United States Environmental Protection Agency**  
Region 5  
Air and Radiation Division  
77 West Jackson Boulevard  
Chicago, IL 60604-3590

**DATE:** JAN 12 2011

**SUBJECT:** Announced Inspection of ConocoPhillips Wood River Refinery  
Roxana, Illinois

**FROM:** Virginia Palmer, Environmental Engineer *VP*  
Enforcement and Compliance Assurance Section (MN/OH)

**THRU:** William MacDowell, Chief  
Enforcement and Compliance Assurance Section (MN/OH)

**TO:** File

**Facility:** ConocoPhillips Wood River Refinery

**Location:** 900 South Central Avenue  
Roxana, Illinois

**Inspection Date:** October 25 – 29, 2010

**Inspection Team:** Virginia Palmer, U.S. EPA Region 5  
Constantinos Loukeris, U.S. EPA Region 5  
Molly DeSalle, U.S. EPA Region 5  
Jamie Iatropulos, U.S. EPA Region 5

**Facility Attendees:** Mike Bechtol, Director of Environmental  
Brian Wulf, Environmental Engineer  
Gordon Terhune, Environmental Engineering Air Engineer  
Gina Nicholson, Health, Safety & Environmental Manager  
Herman Seedorf, Refinery Manager  
Julian Stoll, Operations Manager

**Overview of Company:**

ConocoPhillips' Wood River Refinery (COPC WRR) is one of many global businesses that make up ConocoPhillips Company. COPC is headquartered in Houston, Texas and has locations all over the world. COPC WRR has been in operation as a petroleum refinery since its

construction in 1917. Tosco bought the refinery in 2000. Phillips acquired Tosco in 2001, and Phillips became ConocoPhillips in 2002. COPC WRR acquired the Distilling West units in 2004. In 2007, half of the refinery was sold to the Canadian Company Cenovus.

COPC WRR operates 24 hours a day for 7 days a week.

### **Arrival to Facility and Opening Conference:**

Prior to arrival at the facility, Constantinos Loukeris and Virginia Palmer contacted Mike Bechtol of COPC WRR on October 22, 2010 to announce that an inspection was to take place the week of October 25, 2010. Mr. Loukeris stated that the primary focus of the inspection was Leak Detection and Repair (LDAR) as it applies to the refinery and that 3 Toxic Vapor Analyzer (TVA) 1000Bs would be brought on-site by EPA to conduct EPA Reference Method 21. Mr. Loukeris highlighted the need for the LDAR contractor to be available to confirm any leaks identified by EPA during the inspection. He also asked that a copy of the LDAR database be prepared for EPA to take at the end of the inspection.

Virginia Palmer, Constantinos Loukeris, Molly DeSalle and Jamie Iatropolis ('we') of EPA Region 5 arrived at the facility at approximately 1:30 pm on October 25, 2010. After presenting our credentials to security we met Mike Bechtol, the Director for Environmental, and Brian Wulf, an Environmental Engineer for COPC WRR. After we received our visitor passes, Mr. Bechtol and Mr. Wulf escorted us to a conference room for the opening conference.

Before the opening conference we watched a safety video. After the video we were joined by Gordon Terhune, and Environmental Engineering Air Engineer, Gina Nicholson, the Health, Safety & Environmental Manager, Herman Seedorf, the Refinery Manager, and Julian Stoll, the Operations Manager. We stated that the focus of our inspection would be the processes subject to the Consent Decree entered January 27, 2005. The provisions of Consent Decree apply to pumps and valves. We told them that if we asked about anything that they considered Confidential Business Information, they should let us know and we would treat it as such. Mr. Wulf told us that Summit was the LDAR contractor. Mr. Stoll told us that the benzene extraction unit was getting ready for a turnaround and that it would be shutting down on Friday, October 29<sup>th</sup>, along with Boiler 17.

### **Process Overview:**

Mr. Seedorf provided an overview of the operations at the refinery. They have 2 Fluid Catalytic Cracking Units (FCCUs), 2 cyclic reformers (one of which is shut down), 2 distilling units, one alkylation unit (which uses sulfuric acid), an aromatics unit, a benzene extraction unit, and a saturated gas plant. They also have several hydrotreaters as part of other units. There are packaging and blending operations on-site but Shell still owns them. Valero still owns the land that the Distilling West part of the refinery is on, although COPC owns and operates the equipment.

There are three coke drums at the Distilling West operation that were built around 1973 or 1975.

Three flares at the plant have a Flare Gas Recovery System (FGRS): the Distilling Flare, the North Property Flare and the Aromatics South Flare. The Aromatics North and Distilling West Flares will each get FGRSs as part of the Consent Decree. The Alkylation Flare won't get a FGRS because it has a low volume and receives sweet gas. The Low Sulfur Gasoline Flare will be converted to emergency-only, and all routine gases currently sent to the Low Sulfur Gasoline Flare will be routed to the North Property Flare, so it will not have a FGRS. The other flares at the refinery that do not have FGRSs are the VOC Flare, the Benzene Marine Vapor TO, the Hydrogen Plant Flare and the Air-Assisted Flare.

The refinery is currently undergoing an expansion project that was permitted by IEPA. They are adding a new coker by the north tank farms, a new vacuum unit, a new naphtha hydrotreater, a new hydrogen plant, a new diesel pressure hydrotreater, and they are doubling the capacity of their sulfur trains. The current capacity of the refinery as listed in the Oil and Gas Journal is 306,000 BPD. They currently run about 20% Canadian crude but after the project they project that they will be able to run about 60% Canadian crude. They built a new pipeline, the Keystone pipeline, to get Canadian crude.

#### **LDAR Monitoring Records and Procedures:**

After the process overview we turned the conversation to the LDAR program. We reviewed a printout of the most recent leak rate data (see Attachment 1). COPC WRR has 8 contractors. Five are dedicated monitoring technicians, one is a tagging/inventory specialist, one is a dedicated repair technician and one is a field coordinator. We asked about the most recent monitoring activity and they said that they don't do one unit all at once, but rather they space out monitoring across several units for maintenance reasons. However, they said they'd find out which unit had been monitored within the last week. They said that the only unit that is covered under the HON is the Benzene Extraction Unit.

#### **Closeout for October 25, 2010:**

After reviewing the quarterly leak rate data, we informed the facility personnel that we would monitor CR-1 on October 26, 2010. We ended the first day around 4:15 pm.

#### **LDAR Monitoring:**

Attachment 2 contains the monitoring results from each day and each unit.

#### **LDAR Monitoring: October 26, 2010:**

We started the day by calibrating our TVA-1000Bs at the COPC WRR facility. The calibration is performed at the following concentrations: a zero gas, 500 ppm, 2,000 ppm, and 10,000 ppm. Attachment 3 shows the results of the calibration. Monitoring on this

day took place only in CR-1. Tables A and B identify the leaks over 500 ppm and over 200 ppm identified during the EPA Method 21 monitoring.

Table A. Leakers Over 500 ppm Identified on October 26, 2010

| Component ID | Component Type | U.S. EPA<br>TVA Reading<br>(ppm) | Summit<br>TVA Reading<br>(ppm) | Notes   |
|--------------|----------------|----------------------------------|--------------------------------|---|
| 38576        | Valve          | 808                              |                                | Component placed on DOR on 11/17/09   |
| 28336        | Valve          | 4,520                            | 14,800                         | Component placed on DOR on 11/21/05   |
| 28355        | Valve          | 2,300                            | 9,990                          | Component placed on DOR on 6/1/10   |
| 05935        | Valve          | 620                              | 596                            | 533 ppm after initial repair attempt  |
| 06098        | Valve          | 770                              | 924                            | 929 ppm after initial repair attempt  |
| 214904       | Valve          | 600                              | 635                            | 834 ppm after initial repair attempt  |
| 28403        | Valve          | 4,627                            | 1,688                          | Repair attempt not made because technician could not reach component properly |
| 28781        | Valve          | 615                              | 1,883                          |   |
| 5538         | Valve          | 440                              | 760                            | 433 after initial repair attempt  |
| 5509         | Valve          | 881                              | 800                            |   |
| 212239       | Valve          | 737                              | 798                            |   |
| 28123        | Valve          | 410                              | 537                            | Tagged on 3/11/10 as leaking at 510 ppm                                       |
| 6415         | Valve          | 956                              | 1,430                          | Tagged on 9/20/10 as leaking  |
| 28232        | Valve          | 536                              | 735                            |   |
| 28233        | Valve          | 1,035                            | 4,061                          | Tagged on 9/14/09 as leaking  |
| 28224        | Valve          | 592                              | 749                            | Tagged on 9/22/10 as leaking  |
| 6436         | Valve          | 793                              | 1,000                          |   |

|       |       |       |       |  |
|-------|-------|-------|-------|--|
| 6460  | Valve | 982   | 2,081 |  |
| 6436  | Valve | 560   | 530   |  |
| 6472  | Valve | 1,320 | 1,381 |  |
| 5091  | Valve | 1,680 | 3,345 |  |
| 28245 | Valve | 6,800 | 8,000 |  |

Table B. Leakers Over 200 ppm Identified on October 26, 2010

| Component ID | Component Type | U.S. EPA<br>TVA Reading<br>(ppm) | Summit<br>TVA Reading<br>(ppm) | Notes   |
|--------------|----------------|----------------------------------|--------------------------------|---|
| 38568        | Valve          | 245                              | 66                             | EPA could not repeat reading over 200 ppm                             |
| 06257        | Valve          | 315                              | 254                            | 292 ppm after initial repair attempt                                  |
| 29197        | Valve          | 258                              | 400                            | 606 ppm after initial repair attempt; 585 after second repair attempt |
| 28274        | Valve          | 247                              | 329                            | 26 ppm after initial repair attempt                                   |
| 05860        | Valve          | 203                              | 134                            |   |
| 05938        | Valve          | 252                              | 225                            | 165 ppm after initial repair attempt                                  |
| 28521        | Valve          | 390                              | 275                            | 285 ppm after initial repair attempt                                  |
| 06084        | Valve          | 203                              | 220                            |   |
| 5504         | Valve          | 215                              | 244                            |   |
| 5613         | Valve          | 420                              | 480                            | 405 ppm after initial repair attempt                                  |
| 5507         | Valve          | 440                              | 410                            |   |
| 28136        | Valve          | 431                              |                                | 9/27/10 marked as leaking at 400 ppm                                  |
| 6623         | Valve          | 210                              | 250                            | Tagged 10/20/10 as a leaker   |

During the monitoring, we observed that some of the valves were insulated. EPA Method 21 specifically states that monitoring is to be done by placing the probe inlet at the surface of the component interface where leakage could occur. The insulation on the

valves made it impossible to perform Method 21 as required. We counted 12 valves that were insulated in such a way. See Attachment 4 for a table that lists the tag numbers of all the insulated valves found during the inspection.

During the monitoring, we also observed a connector joint below valve 5717 that had a visual drip. When the TVA was used on the connector joint, EPA got a reading of 10,200 ppm. Summit confirmed this finding with a rate of 13,400 ppm.

We also observed a connector with tag number 5543 which EPA found had a leak rate of 410 pmm. Summit confirmed this finding with a leak rate of 627 ppm.

We also found two conservation vents (C.V.) which were leaking above 10,000 ppm off the pump. The following rates were observed:

| C.V.   | EPA leak rate from C.V. seal (ppm) | Summit leak rate from C.V. seal (ppm) | EPA leak rate from vacuum breaker inlet (ppm) | Summit leak rate from vacuum breaker inlet (ppm) |
|--------|------------------------------------|---------------------------------------|---|--|
| CH-354 | 17,000                             | 46,100                                | 2,000   | 1,800  |
| CH-355 | 12,000                             | 14,500                                | 1,730   | 1,500  |

The facility representatives told us that the vents hold compressor seal oil and that the vents aren't monitored as part of the LDAR program.

We finished monitoring around 4:40 pm. We had a close-out conference with the facility representatives where we confirmed the valves that we found leaking over 500 ppm. We also brought up our concern about the insulated valves and that we believed Method 21 was not being performed on them, and our concerns about the conservation vents. In response to the conservation vents, the facility representatives told us that they follow the requirements for tanks that hold less than 20,000 gallons under 40. C.F.R. § 61.343(b). We stated that monitoring on October 27, 2010 would be in the Butane Unit alone.

### **LDAR Monitoring: October 27, 2010:**

Attachment 3 shows the results of the calibration for the day. Monitoring on this day took place in the Butane Unit and the Alkylation Unit. Tables C, D and E identify the leaks over 500 ppm and over 200 ppm identified during the EPA Method 21 monitoring.

Table C. Leakers Over 500 ppm at the Butane Unit Identified on October 27, 2010

| Component ID | Component Type | U.S. EPA TVA Reading (ppm) | Summit TVA Reading (ppm) | Notes                            |
|--------------|----------------|----------------------------|--------------------------|----------------------------------|
| 34876        | Valve          | 553                        | 392                      | 141 after initial repair attempt |

|        |       |        |         |   |
|--------|-------|--------|---------|---|
| 34896  | Valve | 1,139  |         | 3/17/10 Tag said leaking at 589 ppm         |
| 209332 | Valve | 2,974  | 10,000+ | Tagged on 9/17/10 as leaking at 992 ppm     |
| 209331 | Valve | 348    | 1,000   |   |
| 28627  | Valve | 845    | 710     |   |
| 28653  | Valve | 584    | 625     |   |
| 28640  | Valve | 710    | 814     | 3/18/10 tag said leaking at 724             |
| 29591  | Valve | 1,275  | 10,000+ | 4/19/10 Tag said leaking at 5181 ppm        |
| 29593  | Valve | 740    | 996     | 6/26/10 tag said leaking at 750 ppm         |
| 29562  | Valve | 640    | 925     |   |
| 30827  | Valve | 505    | 860     | 10/15/10 tag said leaking at 1000 ppm       |
| 29558  | Valve | 706    | 955     | 4/19/10 tag said leaking at 965 ppm         |
| 29580  | Valve | 3,413  | 11,000  | 7/29/10 tag said leaking at 2164 ppm        |
| 24305  | Valve | 894    | 623     | 241 ppm after initial repair attempt        |
| 23896  | Valve | 1,113  | 971     |   |
| 23882  | Valve | 730    | 1,000   |   |
| 23886  | Valve | 1,480  | 2,608   |   |
| 14881  | Valve | 720    | 702     |   |
| 217405 | Valve | 680    | 783     | 10/8/10 tag said leaking; Repaired 10/11/10 |
| 217464 | Valve | 830    | 845     |   |
| 29903  | Valve | 733    | 625     | 9/7/10 said leaking                         |
| 29916  | Valve | 17,000 | 81,500  | DOR   |
| 51991  | Valve | 1,161  | 2,059   |   |
| 29958  | Valve | 12,100 | 64,800  |   |

|        |       |        |        |  |
|--------|-------|--------|--------|--|
| 24118  | Valve | 720    | 999    | 8/19/10 tag said leaking; Repaired 8/20/10;  |
| 209019 | Valve | 10,400 | 11,400 | 10/20/10 tag said leaking; Repaired 10/22/10 |
| 24256  | Valve | 11,100 | 12,700 | 10/15/10 tag said leaking                    |
| 23936  | Valve | 670    | 841    |  |
| 24143  | Valve | 1,289  | 1,980  |  |
| 23938  | Valve | 17,000 | 6,900  | DOR  |
| 23979  | Valve | 12,500 | 17,000 | DOR  |

Table D. Leakers Over 200 ppm at the Butane Unit Identified on October 27, 2010

| Component ID | Component Type | U.S. EPA TVA Reading (ppm) | Summit TVA Reading (ppm) | Notes                               |
|--------------|----------------|----------------------------|--------------------------|-------------------------------------|
| 209264       | Valve          | 205                        | 186                      |                                     |
| 34897        | Valve          | 220                        | 250                      |                                     |
| 210096       | Valve          | 250                        | 243                      | 293 after initial repair attempt    |
| 29578        | Valve          | 270                        | 267                      |                                     |
| 209249       | Valve          | 308                        | 410                      | 10/8/10 tag said leaking at 514 ppm |
| 24150        | Valve          | 241                        | 220                      |                                     |

Table E. Leakers Over 500 ppm at the Alky Unit Identified on October 28, 2010

| Component ID | Component Type | U.S. EPA TVA Reading (ppm) | Summit TVA Reading (ppm) | Notes |
|--------------|----------------|----------------------------|--------------------------|-------|
| 33559        | Valve          | 1,022                      | 4,112                    |       |

We observed 11 insulated valves. See Attachment 4 for a table that lists the tag numbers of all the insulated valves found during the inspection.

During the monitoring, we observed an elbow under valve 24113 that EPA found had a leak rate of 965 ppm. Summit did not attempt to confirm this finding.

We finished monitoring around 3:05 pm. We had a close-out conference with the facility



representatives where we confirmed the valves that we found leaking over 500 ppm. We stated that monitoring on October 28, 2010 would be in the Alkylation Unit.

**LDAR Monitoring: October 28, 2010:**

Attachment 3 shows the results of the calibration for the day. Monitoring on this day took place only in the Alkylation Unit. Tables F and G identify the leaks over 500 ppm and over 200 ppm identified during the EPA Method 21 monitoring.

Table F. Leakers Over 500 ppm Identified on October 28, 2010

| Component ID  | Component Type | U.S. EPA TVA Reading (ppm) | Summit TVA Reading (ppm) | Notes  |
|---|----------------|----------------------------|--------------------------|--|
| 107581  | Valve          | 10,000+                    | 22,573                   |  |
| 33646   | Valve          | 12.96%                     | 10,000+                  |  |
| 33642   | Valve          | 10,000+                    | 6,758                    | TVA flamed out over 10,000                   |
| 33640   | Valve          | 10,000                     | 3,000                    | TVA flamed out over 10,000                   |
| 20077   | Valve          | 702                        | 2,245                    |  |
| 20316   | Valve          | 998                        | 1,300                    |  |
| 20331   | Valve          | 20,000                     | 39,200                   |  |
| 20330   | Valve          | 580                        | 381                      | 275 after initial repair attempt             |
| 33559   | Valve          | 1,022                      | 4,112                    |  |
| No tag- needle valve on seal trap vent line on top of sight glass | Valve          | 10,100                     |                          |  |
| 27504   | Valve          | 1,130                      | 2,195                    |  |
| 25294   | Valve          | 700                        | 1552                     | 4/22/10 tag said leaking                     |
| 33221   | Valve          | 1,700                      | 2,135                    |  |
| 20046   | Valve          | 5,200                      | 3,078                    |  |
| 48974   | Valve          | 417                        | 642                      |  |
| 33838   | Valve          | 2,200                      | 4,716                    | 9/7/10 tag said leaking; 9/8/10 was repaired |
| 46241   | Valve          | 540                        |                          | Tagged 10/18/10 and was still an open ticket |
| 36001   | Valve          | 690                        | 899                      | DOR  |

|       |       |       |       |  |
|-------|-------|-------|-------|--|
| 36005 | Valve | 3,120 | 7,000 |  |
| 36010 | Valve | 610   | 733   |  |

Table G. Leakers Over 200 ppm Identified on October 28, 2010

| Component ID | Component Type | U.S. EPA TVA Reading (ppm) | Summit TVA Reading (ppm) | Notes |
|--------------|----------------|----------------------------|--------------------------|-------|
| 20084        | Connector      | 306                        | 400                      |       |
| 20081        | Valve          | 241                        | 244                      |       |
| 20305        | Valve          | 357                        | 394                      |       |
| 33942        | Valve          | 267                        | 308                      |       |

At approximately 2:15 pm we were evacuated from the process area due to upset conditions at another unit. All non-essential personnel were evacuated from the process area.

We found 15 insulated valves. See Attachment 4 for a table that lists the tag numbers of all the insulated valves found during the inspection.

We returned to the conference room. We were informed that there had been a power dip which had caused some of the boilers at the refinery to shut down. We reviewed the LDAR training documentation as well as the LDAR audit reports. We left for the day at approximately 4:30 pm.

#### **EPA Monitoring Summary for October 26-28, 2010:**

Table F: Monitoring Summary

| Unit   | Number of Components Monitored | Number of Leaks Over 500 ppm Identified | Leak Rate (%) |
|--------|--------------------------------|---|---------------|
| CR-1   | 668                            | 22                                      | 3.29          |
| Butane | 514                            | 31                                      | 6.03          |
| Alky   | 451                            | 21                                      | 4.67          |

Table F: Insulated Valves Identified

| Unit | Number of Components Monitored | Number of Insulated Valves | Percentage of Insulated Valves (%) |
|------|--------------------------------|----------------------------|------------------------------------|
| CR-1 | 668                            | 12                         | 1.8                                |

|        |     |    |     |
|--------|-----|----|-----|
| Butane | 514 | 11 | 2.1 |
| Alky   | 451 | 15 | 3.3 |

**Closing Conference: Day 5 – October 29, 2010:**

We arrived at the facility at approximately 8:30 am for the closing conference. During the conference we pointed out some areas of concern that we found during the inspection, including the insulated valves, the conservation vents, 5 components in the Alkylation Unit that were not in the database, items tagged in the field that were not in service, and the leak rate identified found during the monitoring done by EPA versus the historical leak rate for the Alkylation Unit.

We reviewed the overall leak rates from each unit and the number of insulated valves found at each unit with the facility personnel. We stated that no compliance determinations are done on-site; the records we retrieved, along with any additional records we may request through a Section 114 letter, will be reviewed to determine compliance status. We left the facility at 9:00 am.

See Attachment 3 for a listing of each component monitored by EPA during the inspection.

**Attachments:**

1. Leak Rate Data
2. Components Monitored
3. Calibration Data
4. Insulated Valves

